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THE NORTH AMERICAN LYCOPODS WITHOUT TERMINAL CONES.

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There has been some hesitancy among fern students in recognizing the validity of Lycopodium porophilum Lloyd and Underwood as a species. By some it is regarded as a variety or form of L. lucidulum Mx. This is probably due to the intermediate character of the juvenile forms. Mature plants of L. porophilum, however, as determined by the writer resemble L. selago L. more closely. In Ohio one can collect either form without difficulty and numerous specimens have been sent to the Ohio State Herbarium. The species was reported for Ohio by the writer in the spring of 1905 (OHIO NAT. *5:* 301) as occurring in Fairfield county. In December, 1906, while in New York the matter was discussed with Dr. Underwood himself and a careful examination was also made of the original specimens at the New York Botanic Garden. Since that time the Ohio plants have been L. porophilum to the writer and the species a good species.

Underwood's description in "Our Native Ferns and their Allies, Sixth Edition, Revised" defines the typical Ohio specimens very well and also gives the characterization of the two related species correctly in their typical form, although it does not emphasize the character of the general habit. Condensations of the species, descriptions are as follows:

Lycopodium porophilum. Leaves flattened at their bases and ultimately more or less reflexed. *Prostrate portion of stems short,* abundantly rooting, curving upwards, *then dichotomously branching 1–3 times to form a rather dense tuft (2–4 in. high) of vertical stems, densely clothed with spreading or reflexed leaves;* leaves entire or very minutely denticulate. Sandstone rocks.

Lycopodium lucidulum. Leaves flattened at their bases and ultimately more or less reflexed. Prostrate portion of stem longer, frequently rooting, curving upward, and dichotomously branching 1–3 times to form *a loose cluster 4–8 in. high.* Margin (of leaf) erose denticulate above the middle

Lycopodium selago. Leaves hollow at their bases and appressed. *Prostrate portion of stem very short,* abundantly rooting, soon curving upward and dichotomously branching to *form compact tufts (2–7 in. high) of vertically placed branches with dense foliage;* leaves more or less appressed, or at least upwardly directed, entire.

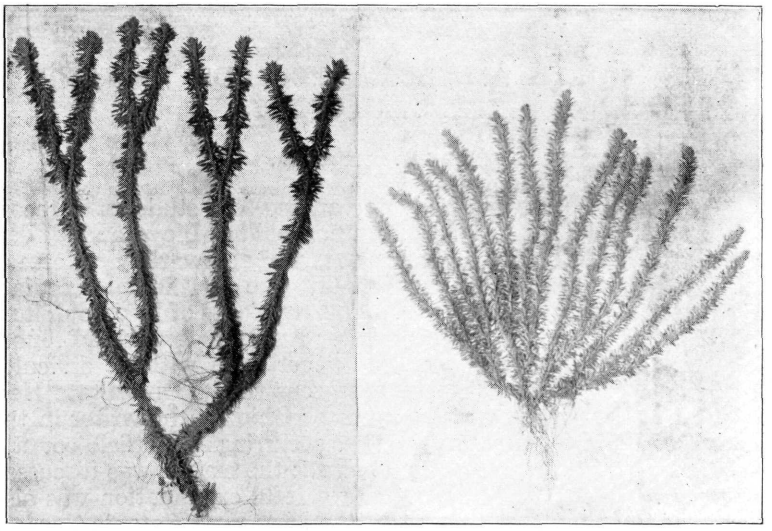

Fig. 1. Lycopodium lucidulum, Hocking County, Ohio.
Fig. 2. Lycopodium porophilum, Fairfield County, Ohio. Photograph by Forest B. H. Brown.

The accompanying figures are given as representative specimens of the three species. The L. lucidulum was collected in Hocking county, while the L. porophilum comes from Fairfield county. L. lucidulum is *successively dichotomous* in habit *at rather regular intervals;* L. porophilum is *several times dichotomous in close succession* with *long unbranched branches.* The leaves agree with Lloyd and Underwood's descriptions.

There has been some question as to whether the Ohio forms referred to L. porophilum might not be L. selago. In order to gain an insight into the character of the European L. selago, the specimens at the United States Natural Herbarium were studied. Through the kindness of Mr. W. R. Maxon, an English specimen and an Alaskan specimen were loaned to the writer for special study.

Photographs of what are regarded as typical examples are here presented. The English plant was from Tilgate forest, Sussex. Both the American and European plant show plainly that the branching habit of L. selago is similar to that of L. lucidulum. The branching is a *successive dichotomy at rather regular intervals.* In the European specimens the leaves are smoother and more rigid in appearance than in the Alaskan plants. In the Alaskan specimens the leaves are slightly crinkled and not so rigid and the surface has a silky-glossy appearance. Specimens in the Ohio State Herbarium from Europe and from the Roan Mountains of North Carolina show the same differences. The Ohio specimens of L. porophilum do not show the crinkled character nor the silky-glossy surface of the American L. selago. Although there is a slight difference between the American and European L. selago, it is too insignificant to be considered.

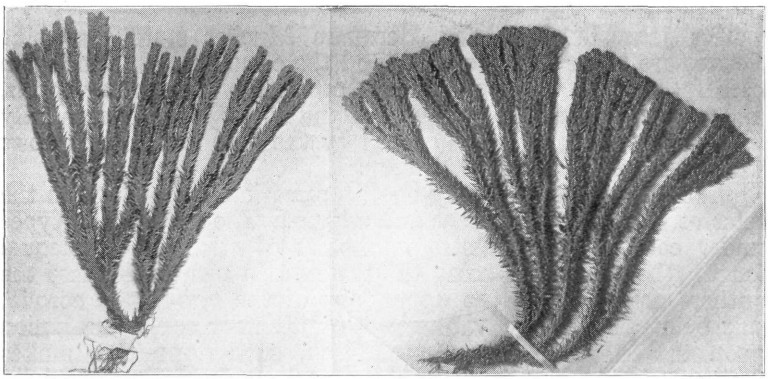

Fig. 3. Lycopodium selago, from Tilgate Forest, Sussex, England.
Fig. 4. Lycopodium selago, from Alaska. Photograph by Forest B. H. Brown.

L. porophilum is readily distinguished from L. selago by its mode of branching and by its reflexed lower leaves. Mature specimens seem, however, to be frequently included with L. selago in collections.

As stated above, incorrect determinations may easily be made from young specimens, but the recapitulation of ancestral characters does not invalidate a species that is well differentiated at maturity. The figures presented above show that we have in America three very characteristic forms of the group of Lycopods under consideration each of which is distinct enough to be regarded as a valid species.